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ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Members of the Entomological Society of Ontario :

GENTLEMEN,—Again it is my privilege as your retiring President to address you, to draw your attention to Entomological subjects, and more especially to the operations of the insect world about you and to record the progress or decline of those noiseless disturbers of our peace—injurious insects.

The City of Ottawa being one of the great centres of our lumbering interest, it seems fitting that I should on this occasion call your particular attention to some of those insects most injurious to our pine forests. The losses occasioned by the destructive work of borers in pine trees both before and after they are cut are unfortunately too well known to those interested in the lumber trade, although the sufferers may not be familiar with the life histories of their enemies so as to be able to recognize them in the various stages of their existence. The lumberman suffers from the work of a number of destructive species, nearly all of which inflict their greatest injuries during the larval stage of their existence.

There are three families of beetles in which are included the greater number of our enemies in this department. I allude to the longicorns or long-horned beetles, *Cerambycidae*; the serricorn or saw-horn beetles, *Buprestidae*, and the cylindrical bark beetles, *Scolytidae*. To go over this long series in detail would weary you. A brief sketch of the life history of a single example in each family will serve as representatives of the whole.

One of the most destructive of the species included in the *Cerambycidae* is a large grey beetle with very long horns, known to Entomologists under the name of *Monohammus confusor*, and popularly in this district as

the "Ottawa Cow." Where trees have become diseased from any cause, or where a fire has ravaged a pine forest and scorched and partially destroyed the timber, or where logs after being cut have been allowed to remain a season in the woods or in the mill yard—there these insects gather and soon multiply to a prodigious extent. The mature insect is over an inch in length; the antennæ of the male reaches the extraordinary length of from two to three inches, while those of the female are shorter. The female lays her eggs in the crevices of the bark, where the larvæ when hatched eat their way into the wood, burrowing extensive galleries through the solid timber; when mature they are large, white, almost cylindrical, footless grubs. They pass their chrysalis stage within their burrows, and the perfect insect on its escape eats its way out through the bark. There are about a dozen species in this family known to be destructive to pine.

Most of the insects belonging to the family *Buprestide* may be recognized by their brilliant metallic colors; they have very short antennæ which are notched on one side like the teeth of a saw, and are often hidden from view by being bent under the thorax. *Chalcophora liberta* is one of the most destructive to pine trees, and its history is very similar to that of the long-horned beetle just described, but the larva is of a different form, and has the anterior segments or rings of the body very large, reminding one of the appearance of a tadpole. The perfect insect is about three-quarters of an inch long, of a brassy or coppery hue, with the thorax and wing-covers deeply furrowed by irregular longitudinal depressions. Dr. Fitch enumerates twelve species belonging to this family which are known to be injurious to pine. Additional information in reference to these beetles may be found in an article contained in the last annual report of our Society, by Mr. J. Fletcher, of Ottawa.

The cylindrical bark beetles, *Scolytidæ*, are also a numerous family, eight species of which are known to attack pine. The boring *Hylurgus*, *Hylurgus terebrans*, is probably one of the commonest. This beetle is about a quarter of an inch long, of a chestnut red color, thinly clothed with yellowish hairs, and is found during the month of May. The larva, which is a small yellowish-white footless grub, bores winding passages in every direction in the inner layers of the bark of the tree, and also through the outer surface of the wood.

In some parts of our Province pines are greatly injured and sometimes killed by the attacks of a woolly bark louse, which covers parts of the

trunk and branches with a white cottony secretion, under the protection of which myriads of tiny lice live, puncturing the bark with their sharp beaks and exhausting the trees by feeding upon the sap.

While we are mainly interested in the preservation of our mature forests, the future of our country demands that we shall not overlook the young growth on which the lumber supply fifty or a hundred years hence must largely depend, and which it should be the policy of our rulers to protect as far as possible. Most of the governments of Europe are now fully alive to the importance of this matter, and are annually spending large sums of money in establishing young forests. Two years ago I called your attention to an insect then recently discovered by Prof. A. R. Grote, of Buffalo, which was greatly injuring the terminal shoots of both the white and red pines in Western New York; it was the larva of a small moth, *Nephteryx Zimmermani*, which fed under the bark, causing a free exudation of resinous matter from the wounds it made, followed usually by the death of the twigs infested. Since then it has been found over a much wider area than was at first anticipated, and I have no doubt but that it is to-day materially retarding the growth of young pine trees in many portions of our Province.

At the recent meeting of the Entomological Club of the American Association for the Advancement of Science (where our Society was represented by your President and Vice-President), Mr. S. H. Scudder, of Boston, submitted some observations on another lepidopterous insect which is injuring the young pines growing on the Island of Nantucket. It is a species of *Retinia* closely allied to *Retinia duplana* of Europe. The moth lays her eggs near the tips of the twigs, down which the young larvae burrow, killing them outright, and thus stunting and almost destroying the trees. Prof. Comstock, of Washington, also referred to two other species of *Retinia* which he had observed injuring the pine trees in that city.

In addition to all these there are a score or two of species of insects which are known to devour the leaves of the pines, damaging them in some instances very much. From the facts enumerated it is evident that we are suffering serious loss in all our lumbering districts from the silent workings of these insidious foes, and since in some measure to be forewarned is to be fore-armed, I desire to call the special attention of those immediately concerned in the prosperity, present and future, of the lumbering interests of our country, to this important subject. Unfortunately it does not as yet seem to be within the power of man to do much directly

towards restricting the operations of these enemies to our forests ; yet this should not deter us from studying their habits and history, since an intimate acquaintance with these may result much more to our advantage than we now anticipate. A few trees, such as a belt, or a group planted for shelter or ornament, may be protected from the leaf and twig destroyers by syringing with a mixture of Paris Green and water in the proportion of a teaspoonful to a pail of water, and the bark lice may be killed by the use of alkaline washes applied with a brush or broom, and a timely application of the same will prevent the operations of the borers ; but it is scarcely possible that such remedies can ever be applied over extended areas of forest. It is, however, gratifying to know that in addition to the numbers devoured by our insectivorous birds, that almost every injurious species is in turn attacked to a greater or less extent by insect parasites of the most active habits, who seek out and destroy these pests with ceaseless diligence ; were it not for these friendly insects the destructive species would be far more numerous individually than they now are.

The question as to how best to check the increase of destructive insects is of the greatest practical importance, and probably no insecticide has of late played so important a part in this connection as Paris Green, which is a compound of arsenic and copper, comparatively insoluble and a substance which seems admirably qualified for the destruction of insect life. Besides its special use as a potato-beetle killer, it can be successfully used to destroy any and every insect which eats the leaves of plants, shrubs or trees. So poisonous an agent should be handled with caution if accidents are to be prevented, and it is a matter of great regret that in consequence of carelessness in its use the lives of many valuable animals have been sacrificed, and occasionally even human lives have been imperilled or lost. From the ease with which it can be procured it has also been resorted to in several instances by those determined on suicide. These unfortunate occurrences are greatly to be deplored, and every possible precaution should be taken to avoid accidents. It is quite a common occurrence for painters, hardware dealers and general merchants to sell Paris Green and to send it out without label of any sort, and sometimes the parcel is very insecurely put up and packed with groceries and other articles for home use in the most indifferent manner. Such recklessness should not be permitted and no one should be allowed to sell any substance so dangerous unless it is properly labelled with the name of the article and the word "Poison" prominently attached ; with such precau-

tions generally adopted many accidents which now occur would be prevented. It has been urged by some that so many evils have attended the use of Paris Green that it does more harm than good, and that its use should be discontinued ; but in this I am not prepared to concur, as I am satisfied that without it, unless some suitable substitute were found, the potato crop in many localities could not be preserved from destruction. If reasonable care is exercised and the powder be used mixed with water, there is no danger attending it, and its use in this manner in the proportion already mentioned of a teaspoonful to a pail of water and applied with a whisk, is not only safe but most economical.

For some years past experiments have been made with various other substances with the view of finding a substitute for Paris Green which would be less dangerous in the hands of the careless, and among them I believe none have been used with greater success than common blue vitriol or sulphate of copper, in solution in the proportion of about an ounce to a pail of water, and applied in the same manner as the Paris Green mixture. This article is worthy of, and will doubtless receive, a more extended trial, as its use under any circumstances would be attended with but little danger. For the destruction of household pests Insect Powder has lately attracted much attention, and is probably the most valuable agent we have for this purpose, and it is quite harmless to man and the higher animals. There are two sorts of this powder, known in commerce under the respective names of Persian and Dalmatian Insect Powder ; the former is the powdered flowers of *Pyrethrum roseum*, the latter of *Pyrethrum cinerariae-folium*. The Dalmatian Powder is most highly esteemed. The powder is diffused through the atmosphere by means of a small bellows, or insect gun, and in a very short time it brings house-flies, cockroaches, etc., on their backs, and dusted among bed-clothing is equally effectual on noxious pests there. It does not at first kill the insects outright, but paralyzes them so that they are unable to use either legs or wings, and after remaining in this condition many hours and sometimes days, a solitary individual here and there will either wholly or partially recover, but the great bulk of them die.

A very active blue-bottle fly placed under the influence of the powder was brought on its back in one and a half minutes. After six minutes it performed some remarkable evolutions, throwing itself about in the most desperate manner by the aid of its wings, for by this time it had lost the use of its legs ; in a few moments more it was quiet, but still able to move

its legs, and this power it retained for two days, after which it was lost sight of. The same powder was applied to a full-grown grasshopper; immediate uneasiness was manifested, and within two minutes its hind legs were partially paralyzed so that they could not be used with much effect. The first symptoms were a general rubbing of the legs against each other and a peculiar backward movement of the body; in four minutes there was a trembling of the whole frame, while all the legs were so much affected that locomotion was very feeble. In six minutes the insect had lost all control over its limbs, and in nine minutes it was on its back with no power to recover its natural position. A second patient manifested precisely similar symptoms, but was not affected quite so rapidly. Applied to house-flies in a room, some of them begin to fall powerless in two or three minutes; others will remain active several minutes longer, but manifest constant uneasiness, evidenced in unnatural movements of wings and legs, and a frequent thrusting out of the proboscis. Having operated in a room one day about noon, I swept up after a few minutes several hundred flies and put part of them in a tumbler covered with a small plate, and the remainder in a chlp box which I carried in my pocket for the first day, where the flies would receive some warmth from the body. After five or six hours the box was opened, when several crawled out or flew with a very weak, short flight; these were evidently recovering; the others remained on their backs, many of them moving their legs now and then. At the same time those in the tumbler were looked at; all were on their backs, but still alive. In twenty-four hours afterwards those in the glass were in the same helpless condition, barely alive, while in the box three more had so far recovered as to be able to walk, and one of them could fly a little. The following day they were examined again and every one of those in the box were dead, while in the tumbler out of 137 there were 22 alive, which number was reduced to three the following day; this small remnant survived two days longer, when all died.

In the use of Insect Powder on the green Aphis which infests house plants, the same course was observed; the insects dropped from the plants as if paralyzed, and after a short time were incapable of locomotion. After two days they were found still alive, but in this instance there was no sign of recovery in any of them, and all died within two or three days afterwards, but whether from the direct effects of the powder or from starvation I was unable to decide.

When I addressed you last year I referred to a strange disease which

had destroyed large numbers of that destructive pest, the Forest Tent Caterpillar, *Clisiocampa sylvatica*. After the disease had reached a certain stage the larvæ remained motionless, retaining their hold on fences and the trunks of trees; shortly, although in appearance they were quite natural, when touched they were found to be dead, and their bodies were so decayed as to burst with a very gentle handling. Subsequent observations convinced me that this was the result of a fungoid disease to which caterpillars, as well as some perfect insects, are very subject. A similar disease sometimes attacks the silk-worm and causes great devastation, and the common house-fly is liable every autumn to die from the effects of a fungus which multiplies with amazing rapidity within the fluids of the fly's body, soon destroys life and forms a circle of luxuriant growth all around its victim. Examples of this may be found on the windows of almost every dwelling during the month of September. Some years ago a learned European professor claimed that he had proved the identity of this fungus with the common blue mould and also with that of yeast; and in proof used the fungus of the fly for the purpose of raising bread, and showed that it was possible to brew beer with the common mould. The close relationship, if not the actual identity, of these three was thus established. Quite recently it has been proposed by Dr. Hagen, of Cambridge, Mass., to use a diluted solution of yeast in water with an atomizer as a means of destroying noxious caterpillars and other insects by introducing disease among them, and it seems quite likely that the use of this remedy may to some extent prove effectual.

The Cabbage Butterfly, *Pieris rapæ*, having pretty well colonized the northern portions of America, is still traveling southward. During the present season it has been reported as common in many localities in the State of Alabama, and has nearly reached the Gulf of Mexico; it seems as capable of adapting itself to extremes of heat as of cold. The Forest Tent Caterpillar, *Clisiocampa sylvatica*, which has been so very numerous and destructive in our neighborhood for two years past, has almost disappeared. The Colorado Potato Beetle seems to have fairly established itself in several places in Europe, and if it proves as prolific there as here it will be rapidly disseminated. The Wheat Midge, *Cecidomyia tritici*, has appeared in the neighborhood of Port Hope, Ont., but not to any alarming extent. The Plum Curculio, *Conotrachelus nenuphar*, has been common as usual, while reports have been received from several districts of the increasing prevalence of the Codling Worm, *Carpocapsa pomonella*.

Our journal, the CANADIAN ENTOMOLOGIST, has been well sustained during the past year, and through the kindness of our esteemed contributors we have been enabled to present our readers with many original papers of great practical value. Mr. W. H. Edwards, of West Virginia, has continued his very useful and valuable papers on the life histories of our butterflies. Dr. Bailey, of Albany, N. Y., has given us an interesting description of the various stages of *Cossus Centerensis*, illustrated by an excellent lithographic plate. Many new species of insects have been described by Messrs. A. R. Grote, W. H. Edwards, V. T. Chambers, Prof. Fernald and others, besides which we have published a very large number of papers of general interest.

Among the more important recent contributions to our Entomological literature may be mentioned a new edition of the Catalogue of the Described Diptera of North America, by Baron Osten Sacken; the Coleoptera of Florida and Michigan, by John L. LeConte, M. D., and E. A. Schwarz; Report on the Insect and other Animal Forms of Caledonia Creek, New York, by J. A. Lintner; the Coleoptera of the Alpine Regions of the Rocky Mountains, by John L. LeConte, M. D.; on the Collection of Insects made by Dr. Elliot Coues in Dakota and Montana—the Orthoptera by Cyrus Thomas, Hemiptera by P. R. Uhler, Lepidoptera by W. H. Edwards; Notice of the Butterflies Collected by Dr. Edward Palmer in Southern Utah and Northern Arizona, in 1877, by Samuel H. Scudder; and an account of some insects of unusual interest from the Tertiary Rocks of Colorado and Wyoming, by the same distinguished author. The elaborate and voluminous report of the U. S. Entomological Commission on the Rocky Mountain Locust, with maps and illustrations, issued in 1878, did not reach us in time to be noticed at our last annual meeting. It is a work which has involved great labor, and besides containing much that is new, covers the entire field of our knowledge in reference to this destructive pest. Prof. C. V. Riley, of Washington, has issued a special report on the Silk-worm, being a brief manual of instructions for the production of silk, with illustrations. Prof. A. R. Grote has written Preliminary Studies on the North American Pyralidæ, and Samuel H. Scudder a Century of Orthoptera. Several additional numbers of Edwards' magnificent work on North American Butterflies have appeared, with charming plates.

The members of the Entomological Commission of the United States are devoting their attention this year especially to the Hessian Fly, inves-

tigating its habits, preparing statistics of the losses occasioned by its attacks, and testing the various remedies which have been suggested for its destruction. In a circular issued in June last they solicit the co-operation of Entomologists, many of whom will, I trust, be able to render them efficient aid in this good work.

During the year death has removed from our ranks three well known laborers in the Entomological field, Dr. Asa Fitch, late State Entomologist of New York; Dr. Hermann Loew, the eminent German Dipterist, who has done so much to advance our knowledge of American Diptera; and Frederick Smith, the renowned English Hymenopterist. Thus year by year we are called to mourn the loss of those whose names, for their works' sake, we revere. They have gone to their reward; we live to labor. Let us each endeavor to make the best possible use of the time and opportunities we have, however limited they may be, and diligently and contentedly labor in the sphere in which God has placed us; prompted by pure motives, may we with earnest effort probe deep into the secrets of nature, and draw from thence treasures new, so that when we pass away we may leave behind us some little lustre which may lend a light, however dim, to those who will fill our places.

I have the honor to be very sincerely yours,

WM. SAUNDERS.

ON THE PREPARATORY STAGES OF CERTAIN FLORIDA BUTTERFLIES.

Editor Canadian Entomologist:

I have received from Dr. A. W. Chapman, of Apalachicola, descriptions of preparatory stages of several species of Florida butterflies, made by him 1870-1872, with permission to publish such as I saw fit. I send one instalment confined to the Hesperidæ, and where it seemed desirable I have added notes of my own in brackets. Except in case of *Eudamus Proteus*, wherever Dr. Chapman has described larvæ which are also figured by Abbot, in Smith-Abbot, Insects of Georgia, or by Boisduval and LeConte, after drawings of Abbot, the description differs essentially from the